Urban Warfare Communications: A Contemporary Russian View

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Russian combat experience in urban warfare includes World War II, fighting in Budapest during the 1956 Hungarian revolution, and fighting in Herat and Kandahar during the 1979-1989 Soviet-Afghan War. In December 1994, the Russian Army entered the breakaway Republic of Chechnya and attempted to capture the capital city of Grozny from the march. After this attempt failed, the Russian Army spent two months in deliberate house-to-house fighting before they finally captured the city. Fighting still occurs sporadically in Grozny. During the battle for Grozny, Russian forces experienced difficulty in communicating within the city. Russian ground forces, like other ground forces, did not train for communicating on urban terrain in their training centers, since the training centers are never big enough to replicate the special communication problems of a city. Furthermore, they did not replicate the need for units to share identical frequencies in urban combat. Additionally, their unit training emphasized the use of FM and UHF radio, whereas the modern urban landscape already contains cellular phones, computer nets, fiber optic cable and other modern communications systems.

Once a fighting force enters a city, communications pose distinct problems. The force fragments and loses sight of flanking elements. Radios often don't work or work sporadically. If the civilian telephone system is inoperable, senior commanders may initially be unable to control the battle. In this case, the battle quickly becomes a platoon leader's fight. The Russian Army is conducting a self-appraisal of its on-going performance in the fighting in Chechnya. Russian military theoreticians are paying close attention to the conduct of urban combat.[1]

Radio Communications During Urban Combat [2]

Tall buildings and other towering structures in a modern city absorb, interfere with and reflect radio transmissions on the FM and UHF bands. Further, industrial sites and tall buildings can degrade transmission quality and range. Prior to entering a city, signal planners must consider the nature of radio wave diffusion, carefully select the primary and alternate radio frequencies and determine what will interfere with street-level communications (both while moving and stationary). Large cities have powerlines, electric train and trolley lines, and industrial power lines that can also interfere with communications. However, there are instances where such transmission lines retransmit an intensified signal along the same path as the transmission line. Conversely, these lines can generate from 100 to 300 times interference over normal atmospheric interference on the UHF band.

A limited number of frequencies, normally on the lower part of the band, work in cities. Consequently, the bulk of enemy and friendly radios use the same bands. With the inevitable concentration of forces in city fighting, this can create a complicated electromagnetic situation in a small area. Further, as happened in Grozny, the enemy may try to enter a friendly net to misdirect forces and transmit false reports or monitor tactical communications. Therefore, the combined arms commander and his commo chief must take into consideration the terrain characteristics when selecting the command post location in order to insure maximum transmission range. Experience shows that proper planning can alleviate or eliminate many of the communication problems encountered in city fighting. First, the planner must develop the optimum signal plan, use directional antennas and select the proper frequencies. Second, he must use radios with automatic retuning and secure voice capabilities. Often, armored-vehicle mounted FM radio communications can be improved by adding an additional receiver.

When fighting in a city, it is best to use directional transmissions. This is accomplished by using a lambda-type antenna, or traveling wave antenna, and changing the broadcasting power and frequencies. It is best to dedicate one radio set to communicating with a separate subunit, rather than trying to communicate over a net. Naturally, this will mean positioning additional radio sets to support all these single-subscriber stations. Sometimes radio communications can work through the effects of "architectural guidance" and "obstacle amplification" (Figure 1). A directional antenna can use stone or brick walls as passive retransmitters to bounce signals down a street. Radio retransmitters should be positioned at crossroads in order to communicate with elements on perpendicular and other streets.[3] In Grozny, aircraft carried radio retransmission units to support communications.

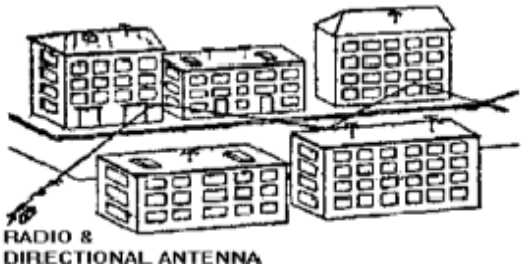

Figure 1

If the city has tall buildings with iron support beams, or if the buildings have metal roofs, position UHF transmitters some three-to-five times the height of the intervening building away from that building (Figure 2). Avoid positioning radios near power and telephone lines. If a radio is located inside a building, its antenna must be positioned at an upper-story door or window facing the receiving station or on the roof. A directional antenna is better than a whip antenna. Naturally, the radio and operators need protection from artillery and small-arms fire and aviation strikes. The best places to situate a radio are in the basement or under the stairs. Use a 10- to 15-meter long cable to connect the radio to the antenna, but avoid longer cables as they weaken the transmission. Whereas a whip antenna attracts enemy attention and fire, practically every building has a television antenna. Use a feeder attachment to connect UHF radio to an existing television antenna (Figure 3).

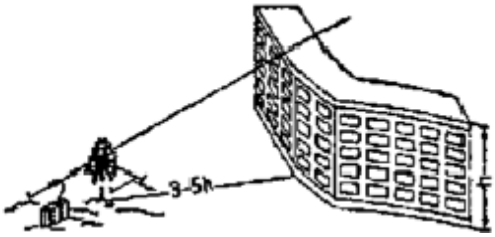

Figure 2

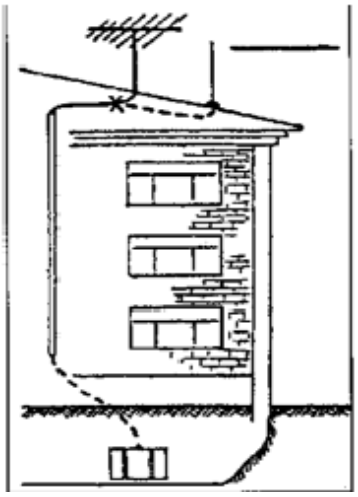

Figure 3

If the command post is located in a trench, or dug out or in a basement, directional antennas are deployed along the ground (Figures 4 a and b) for single-subscriber communications. However, a multidirectional (whip) antenna must be used for communicating in a multiple-subscriber net. Sometimes this may involve positioning the radio set itself on the roof top close to a television or radio antenna mast. In that case, run a radio-telephone remote unit from the radio to the sheltered command post (Figure 5).

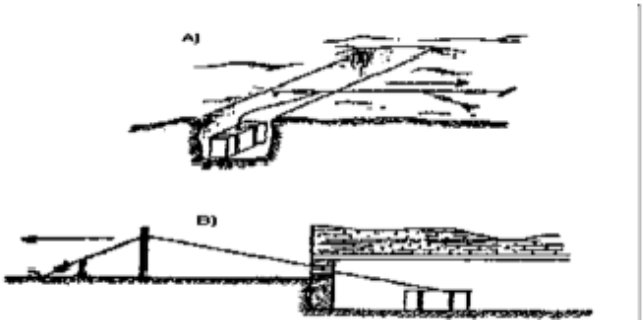

Figure 4

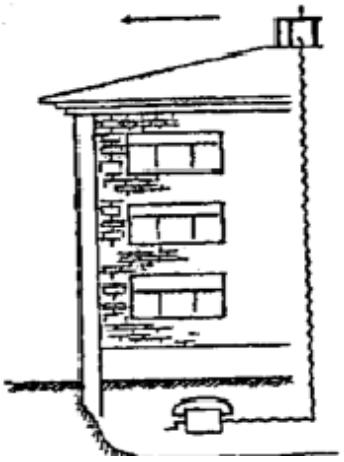

Figure 5

Often, moving the antenna a few meters can improve reception. Communications using a directional antenna with a clear line of site to the other station is best. When a tall object, such as a church, is located between the stations, the stations should aim their directional antenna at a common point (Figure 6).

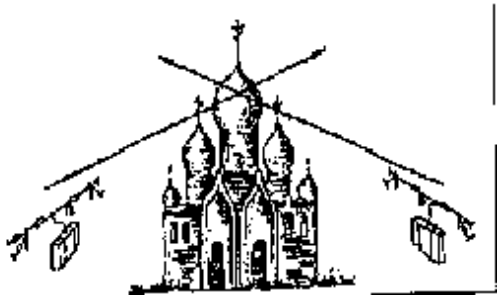

Figure 6

Clear text transmissions are a problem in any conflict. The Chechens regularly intercepted Russian radio traffic. Further, when the Russian columns were approaching Grozny, the

Chechens used Russian radio transmissions to determine force locations and select strike zones for BM-22 multiple rocket launcher attacks.[4]

Wire Communications during Urban Combat[5]

There are drawbacks to using wire communications during urban combat. Artillery fire, aircraft strikes, collapsing buildings, fire, and tracked vehicles readily destroy wire. Furthermore, since urban combat is a slow, deliberate process, command posts remain in the same position for long periods of time. Enemy scouts can readily determine the location of command posts by tracing the wire back to key locations. Once the command posts are located, the enemy can target them for artillery fire, intercept communications, or even enter the net to pass misleading information. Further, laying and retrieving wire takes two to three times longer on urban terrain, and much more wire is used.

Still, wire communications are necessary to support urban combat. The normal TO&E combat load of wire for a battalion or regiment is insufficient for urban combat and additional wire must be ordered and carried. Use standard issue wire for the main communication lines. All wire should be insulated, single-pair wire, since the wire may have to be buried. A single strand of wire won't work well when buried. Bury at least the first 500 meters of wire leading from any forward fighting position back toward the command post.

If there isn't enough issue wire, use field expedients. Sections of knocked-out telephone line or high-voltage electric power line are best, but even barbed wire can be used in an emergency. However it uses much more energy. Field expedient wire is also easier for an enemy to to eavesdrop on. If non-insulated wire is used, use insulators made of rubber, glass or ceramic (Figure 7).

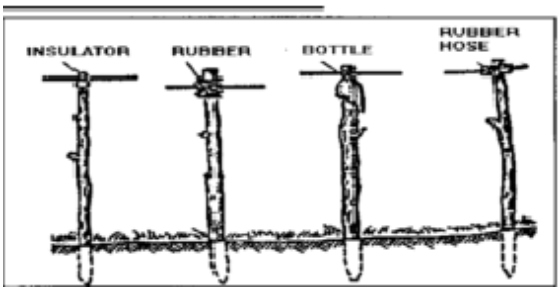

Figure 7

It is best to string wire through backyards, parks, public gardens and along back streets which have little traffic. Lay wire along fences, hedges, trees, and, when necessary, over buildings. String wire no less than three and a half to four meters high where it crosses a street and no less than two and a half to three meters high through trees or where attached to buildings. Use a pole to support any intervals of suspended wire that stretch beyond 70 meters. Do not string wire on existing, active telephone, telegraph or retransmission poles since their electric field will interfere with communication. If the same poles must be used, and the current is 220 volts or less, wire can be strung on the same poles provided that it is strung one-and-a-half meters from the live wires. A wire holder should be attached to every fourth pole (Figures 8 a & b). Do not

lay wire within 200 meters of any prominent feature that may draw artillery fire or aerial bombardment.

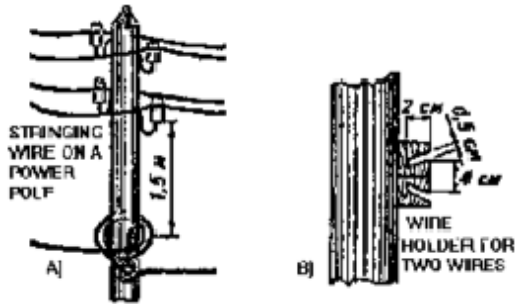

Figure 8a & Figure 8b

Lay wire under trolley and railroad tracks between the sleepers. Bury the wire to a depth of 10 to 15 centimeters in the roadbed and anchor the wire on both sides of the roadbed with wooden stakes. Ensure that there are no splices in the wire that crosses under the tracks.

Laying wire across a water obstacle over 100 meters in width requires special preparation (Figure 9). Drive two large stakes a meter apart on both banks. Anchor the wire with a figure-eight to the stakes and dig a ditch for the wire (up to 50 centimeters deep) leading into the water. Lay the wire in the ditch and bury the wire and stakes. Use a boat or float to lay the wire across the water and anchor the wire every 10 to 15 meters.

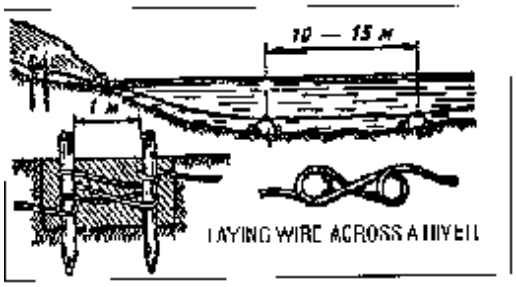

Figure 9

Where possible, use the civilian telephone network.[6] If the telephone system is not functioning, its lines can still be used or the system can be restored when supplemented with military wire communications. Apartment buildings, stores and factories are wired into the civilian telephone system. Every building has a telephone distribution box which controls 50 to 200 individual telephone lines. It is relatively easy to set up wire communications using these points. Figure 10 shows a typical battalion wire communications setup. The P-139M telephone switch board is set up at the battalion command post and handles up to eight lines. One line runs to the regimental CP and one line each runs to the neighboring battalions. The remaining five run to battalion elements. Lines run between the company strongpoints. The battalion uses one of its lines to connect with a local factory automatic telephone switch (YPATS) that handles lines to the 2nd Motorized Rifle Company (MRC) and the mortar battery. Further, the battalion has a line which runs into the city telephone network and then to the 1st MRC, 2nd MRC and 3rd MRC. A

separate line runs to the air defense platoon. Another line runs to the support elements and battalion aid station. Another line runs into main telephone cable.

The same soldiers who lay wire maintain it. If wire communications are lost, both subscribers send out a lineman to find the break and restore communications. Since wiremen are subject to enemy fire, it is a good idea to prepare shallow trenches or positions along the route in which they can shelter. The wireman checks surface wire by running along the wire letting it pass through his hand. If the wire is buried, he checks for breaks by hooking up his telephone at various juncture points. When a break is discovered, either splice it or insert a temporary bypass.

Commentary[7]

The above are practical solutions for using the existing communications equipment present in the Russian Army. Urban combat requires many additional radios, since single-subscriber nets broadcasting with directional antenna are the most reliable way of communicating by radio. Comparatively few frequencies are suitable for urban terrain and these will be crowded. Airborne radio-retransmission is an option provided that the enemy's air defenses are weak. In the future, perhaps retransmission units can be mounted on remotely-piloted vehicles (RPVs). Wire communications are necessary in city fighting but have their own set of problems. They are hard to install and maintain and require a lot of time. Earlier Soviet articles and books stressed the problems of working through enemy jamming during city fighting. Since both sides are using the same frequencies and are located very close to one another, this may not be a significant problem. Urban terrain and frequency overload will interfere with communications naturally.

What is missing from the above is an appreciation of the impact of the cellular telephone on modern battlefield communications. Cellular phones work well in cities--for either side. The Russian Army has few cellular phones. The Chechen guerrillas used cellular phones conspicuously in front of journalists. Cellular phones can be knocked out by taking out the repeater stations throughout the city or destroying the central telephone system. Both practically require capturing the city first. Another way to attack cellular phones is to use the signal from the repeater stations' omni-directional antenna to locate them and then direct artillery on them. Yet another way is to knock out the microwave or satellite link to limit communications to the local area. Unless the ground terminal for the satellite or microwave can be destroyed, this may involve attacking international commercial systems and require political clearance. Apparently, the Russians made no attempt to disrupt the Chechens' cellular communications. Although this new technology is not incorporated into the Russian Army communications system, the Russians apparently are collecting intelligence and order of battle data through cellular phone intercepts. There is no evidence that the Chechens have digital or encrypted cellular telephones which could frustrate a collection effort. Further, the Chechen resistance leader, General Dudaev was reportedly killed on the night of 20-21 April 1996 by an aviation strike while using a cellular phone. This suggests the possibility that the Russians were monitoring cellular calls to track and target General Dudaev.

Also missing is an appreciation of the impact of the portable computer, fiber optics and amateur radio on modern battlefield communications. While no evidence exists that either side used

computers extensively in the fighting, computers are an integral part of the modern battlefield. Computers link to FM radio for burst transmission or hook into standard telephone networks.

Apparently there is no fiber optic cable in Grozny, but as communications are upgraded, buried fiber optic cable will become increasingly common. Currently, there is no easy way for military wire communications systems to hook into fiber optic cable.

Amateur radio stations have not played an apparent role in the fighting in Grozny, but in other conflicts, ham radio operators have had a decided impact. Commercial radio and television stations can also play a role but are fairly easy to put out of action.

The fighting in Chechnya is a frustrating experience for the Russian Army, but they are extracting lessons from it. Clearly, communication in urban combat is a problem for them and they are searching for ways to address it. Other armies can profit from their experience when training or preparing to deploy on urban terrain.

ENDNOTES

1. In January and February 1996, ***Armeiskiy sbornik (Army digest)*** ran articles about communications during urban combat, which are updates of articles published in ***Voyennyy vestnik (Military herald)*** in 1988 and 1989. This article is based on these sources.

2. This section is taken from Vitali Kudashov and Yuri Malashenko, **"Svyaz' v gorode" (Communications in a city),** ***Armeiskiy sbornik,*** January 1996, 30-32. This is an update of an article by P. Kostevyat and A. Bubnov, **"Radiosvyaz' pri oborone krupnykh naselennykh punktov" (Radio communication in the defense of large, built-up areas),** ***Voyennyy vestnik (Military herald),*** December 1989, 53-56. The illustrations are the same, but much of the content in the later article is derived from the fighting in Grozny.

3. There appears to be a problem with Figure 1, which shows radio signals bouncing off glass windows. The reflective properties of glass are different than brick or stone. Further, most window glass near fighting will be shattered and bounced signals can be trapped in rooms. This technique would seem to work best along high-walled streets.

4. N. N. Novichkov, V. Ya. Snegovskiy, A. G. Sokolov and V. Yu. Shvarev, ***Rossiyskie Vooruzhennye Sily v chechenskom konflikte: Analiz, Itogi, Vyvody (Russian Armed Forces in the Chechen Conflict: Analysis, Results, Conclusions),*** Moscow: Kholveg-Infoglob, 1995, 99.

5. This section is taken from Petr Kostevyat, **"Provodnaya svyaz' v boyu za gorod (Wire communications in urban combat),** ***Armeyskiy sbornik (Army digest),*** February 1996, 40-44. This is an update of his earlier article with A. Bubnov, **"Pri oborone goroda" (When defending a city),** ***Voyennyy vestnik (Military herald),*** September 1988, 72-75.

6. Security on the civilian telephone net is practically impossible.

7. Bill Mendel, Tim Thomas, Steve Gotowicki, Randy Love, Greg Celestan, John Sray, and Marcin Wiesiolek of FMSO contributed to this analytical segment. Major Barbara Cassidy, a student at the Command and General Staff College, provided a signal officer's perspective.